

## SPECIFICATION

### TO WHOM IT MAY CONCERN

BE IT KNOWN, That I I Joseph A. King, a citizen of the United States, residing in Wayzata, Hennepin County, State of Minnesota have invented new and useful improvements in ACTIVITY ENHANCED DISPENSERS of which the following is a specification.

## **FIELD OF THE INVENTION**

This invention relates generally to fluid systems and, more specifically, to a fluid system that can enhance the dispensing rate due to increased system activity in a fluid that may or may  
5 not contain debris.

## **CROSS-REFERENCE TO RELATED APPLICATIONS, IF ANY**

This application is a continuation-in-part of U.S. patent application Ser. No. ??? filed  
October 9, 2003 which is a continuation-in-part of U.S. patent application Ser. No  
10 10/632,682 filed July 21, 2003 which is a continuation-in-part of U.S. patent application  
Ser. No 09/628,637, filed July 30, 2000.

## **STATEMENT REGARDING FEDERALLY SPONSORED RESEARCH OR DEVELOPMENT**

15 Not applicable.

## **REFERENCE TO A MICROFICHE APPENDIX, IF ANY**

Not applicable.

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## **BACKGROUND OF THE INVENTION**

One of the difficulties with treatment of water in the skimmer basket region of a pool or spa  
is that the water treatment device becomes clogged with debris. One prior art approach is  
shown in U.S. patent 5,124,032 where the canister that holds chlorine is maintained above  
25 or along side the skimmer basket. Another approach is shown in U.S. patents 5,779,913 and  
6,019,893, which show a dispenser that is secured to the underside of a skimmer basket.

While not holding water purification materials, U.S. patent 5,830,350 discloses a pool skimmer basket that includes a central member that projects above the top of the skimmer basket in order to prevent the basket from becoming clogged and thus preventing flow there through. Thus, the placement of water purification devices in a skimmer basket is  
5 generally avoided because of clogging problems.

The present invention provides a water treatment system wherein a water treatment device can be effectively positioned in a number of different locations in the flow of water with debris, with the water treatment device maintaining the water inlet to the water treatment  
10 device in a condition, wherein water can continue to be directed through the water treatment system even though there is a continual presence of debris in the water flowing around the water purification device.

A further feature of the invention is that as the activity level in the body of water increases  
15 the rate of delivery of dispersant to the body of water can partially or wholly offset the increased bacterial load on the system as a result of the enhanced activity.

### **BRIEF DESCRIPTION OF THE PRIOR ART**

U.S. Patent 5,830,350 discloses a pool skimmer basket with a central core projecting above  
20 the top of the skimmer basket.

U. S. patent 5,124,032 discloses a swimming pool chlorinator that is maintained above the bottom of the skimmer basket.

25 U. S. patents 6,019,893 and 5,779,913 disclose a water purification device that is secured to the underside of the skimmer basket.

### **SUMMARY OF THE INVENTION**

A fluid system including an attachable dispenser proximate a fluid transition region wherein the activity level of the fluid in the system can change the rate of dispersant dispensed into the fluid system from the dispenser so that in some cases one can immediately begin to  
5 partially or wholly offset an increased bacterial load on the system as a result of enhanced activity within the system.

### **BRIEF DESCRIPTION OF THE DRAWINGS**

Figure 1 is a perspective view of the water purification device of the present invention;  
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Figure 2 is a front view of the water purification device shown in Figure 1 with the water purification device positioned on a puck;

Figure 3 is a top view of the water purification device shown in Figure 1;  
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Figure 4 of the water purification device of Figure 1;

Figure 5 shows the water purification device located in a skimmer basket in a swimming pool with a bacteria-killing puck supporting the water purification device;  
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Figure 5A shows a skimmer weir in a pool with a dispensing mechanism secured to the weir;

Figure 5B shows a back view of the skimmer weir of Figure 5A;  
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Figure 5C shows a top view of the skimmer weir of Figure 5A;

Figure 5D shows perspective of the dispensers secured to the skimmer weir of Figure 5A;

Figure 6 shows the water purification device positioned in the bottom of a skimmer basket with the top of the water purification device located below the top of the skimmer basket;

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Figure 7 shows the water purification device located below the skimmer basket in a pool of water with a bacteria killing puck located in the skimmer basket;

Figure 8 shows a cross-sectional view of a swimming pool fitted with various embodiments of a water purification system;

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Figure 9 shows an exploded view of one embodiment of a water purification system for placement adjacent a main drain intake of a pool;

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Figure 10 shows the water purification system of Figure 9 in operational use;

Figure 11 shows an exploded view of another embodiment of a water purification system for placement in the contained water volume of a pool;

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Figure 12 shows the water purification system of Figure 11 in operational use;

Figure 13 shows an exploded view of another embodiment of a water purification system for securing to a water return inlet fitting of a pool;

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Figure 13A shows a partial section view of a dispenser mounted in the return of a water system;

Figure 13B shows a partial sectional front view of the dispenser of Figure 13A;

Figure 13C shows a partial sectional back view of the dispenser of Figure 13A;

- 5     Figure 13D shows a partial section view of a dispenser mounted in the outlet of a water system;

Figure 13E shows a front view of the dispenser of Figure 13D;

- 10    Figure 13F shows a partial sectional front view of an alternate embodiment of dispenser for mounting in the outlet of a water system;

Figure 13g shows the dispenser of Figure 13F in the insertion condition;

- 15    Figure 13H shows a front view of the dispenser of Figure 13F;

Figure 14 shows the water purification system of Figure 13 in operational use;

- Figure 15 shows an exploded view of another embodiment of a water purification system  
20    for securing to a water return inlet fitting and placement in the contained water volume of a pool;

Figure 16 shows the water purification system of Figure 15 in operational use;

- 25    Figure 17 shows an exploded view of another embodiment of a water purification system that includes a pump prefilter member with an internal debris-retaining basket supporting the water purification device;

Figure 18 shows an exploded view of another embodiment of a water purification system that includes a debris collection member with a debris-retaining mesh bag containing the water purification device;

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Figure 19 shows the water purification system of Figure 18 in operational use;

Figure 20 shows a partial sectional view of another embodiment of a water purification system that includes another debris collection member with a debris-retaining mesh bag containing the water purification device;

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Figure 21 shows an exploded view of another embodiment of a water purification system that includes a cartridge filter member with a support member holding the water purification device atop the filter member;

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Figure 21A shows a filter cartridge with a stand for dispensers thereon;

Figure 21B show a partial section view of the stand and filter of Figure 21A;

20 Figure 21C shows a partial section view of a dispenser four mounting on the stand of Figure 21A;

Figure 22 shows the water purification system of Figure 21 in operational use;

25 Figure 22A shows a partial section view of a filter housing supporting two dispensers therein;

Figure 22B is a partial section view of the dispenser in the lid of the filter housing of Figure 22A; and

Figure 23 is a partial section view of a skimmer filter with dispenser mounted in the cover thereof.

### DESCRIPTION OF THE PREFERRED EMBODIMENT

Figure 1 is a perspective view of a free standing water treatment device 10 usable in the water treatment system with the water purification device having a general spherical shape with a cover 12 that is also suitable for use as a handle for removing and replacing the water purification device when the water treatment material therein is spent or the skimmer basket is removed for cleaning. That is, cover 12 is spaced sufficiently far from shroud 11 so that a user can insert his or her fingers beneath the cover to lift the water purification device free of the skimmer basket.

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A shroud 11 extends radially outward to extend circumferentially over a container 13 located thereunder. Shroud 11 includes a first set of shroud water inlets 11a, a second set of shroud water inlets 11b and a third set of shroud water inlets 11c for directing water into container 13. Each of the individual water shroud inlets has an arcuate shape and each of the water inlets includes at least three water inlet ports with the apex of each of the arcuate shroud water inlets located at the highest vertical position of the shroud inlet. The shroud inlets together with the shroud, as will be described herein, provide for flushing debris away from the shroud inlets.

Figure 2 is a front view of the water purification device 10, with the water purification device positioned on a puck 30 comprising a bacteria killing chemical such as bromine or chlorine.



In the operative position, the water purification device can handle two different and distinct water treatment products while maintaining the flow of water into contact with both materials to thereby ensure that the water can be rid of unwanted bacteria or algae.

- 5 The water purification device 10 is shown with shroud 11 extending radially outward over container 13 a distance denoted by R. Shroud 11 forms a lateral top shield for a circumferential water inlet 22 formed between container 13 and cover 11. That is, a set of tabs 18 connect and hold shroud 11 in a spaced condition from container 13 so that water can flow laterally in the circumferential inlet 22 located around the periphery of the water
- 10 purification device 10. The purpose of having shroud 11 extend beyond the periphery of container 13 is to enable the shroud to carry water and debris that impinges normally on the water purification device to be carried past the lateral shielded water inlets 22. The arrow indicates the direction of water flow as the water flows over the circumferential edge 20 of the shroud 11. However, since the water itself will tend to be drawn backward to the
- 15 underside 28 of shroud 11 by the Coanda effect, water will be directed laterally inward into container 13 through inlet 22. Consequently, for debris to enter circumferential inlet 22 would require that the debris make an abrupt change in direction to flow into the circumferential inlet. Consequently, the momentum of the debris causes it to separate from the flow of water and be carried past the circumferential inlet 22. Thus, the circumferential
- 20 water inlets 22 provide one path for ingress of water into water purification device 10 while inhibiting debris from entering therein.

Located on the top portion of water purification device 10 is a cylindrical extension 15 that extends vertically upward from shroud 11 to the underside of cover 12. Figure 3 illustrates

25 that cover 11 shields the cylindrical extension 15. Located within cylindrical extension 15 is a set of circumferentially spaced elongated slots 15a that communicate with an interior chamber of water purification device 10. Elongated slots 15a provide a primary water inlet

of water into the water purification device 10 while the cover 12 shields the water inlets from clogging with debris by extending laterally past the elongated openings to thereby inhibit debris from entering water inlets 15a.

- 5 The positioning of water inlet 15a at the top of the water purification device provides a two-fold purpose. First, it allows water to flow into the water purification device and passage 60 even if the debris in the skimmer begins to build to a height sufficient to cover the skimmer basket. That is, if the debris builds up around the periphery of the water purification device 10, it creates a greater resistance for water flow around the water purification device 10.
- 10 Consequently, if any water can still flow through the skimmer basket loaded with debris, the water will continue to flow in the path of least resistance that is through the center of the water purification device and through passage 60. Thus, the system operates to purify water even if the skimmer basket becomes filled with materials. Of course it is good practice not to allow the skimmer basket to become completely filled, as one should periodically
- 15 empty the skimmer basket. Second, it allows water to flow into the water purification materials in the water purification device even though the skimmer basket may be filling up with debris.

In the embodiment shown, a set of legs 31 support the water purification device 10 on top of puck 30 with a water discharge outlet formed in the space between the underside of water purification device 10 and puck 30. If puck 30 rests on the bottom of the skimmer basket, the water flowing through the water purification device 10 will be able to be released into the water, since the radially extending shroud and container 13 shields the water outlet from the container from debris.

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A further feature of the water purification device is that the water purification device 10 maintains a debris free footprint on the bottom of the skimmer basket. That is, container 13,

which is supported on legs 31, occupies a circular space over the bottom of the skimmer basket to prevent debris from falling into a circular area on the bottom of the skimmer basket and thereby completely clogging the bottom of the skimmer basket with debris.

5 Figure 3 is a top view of the water purification device 10 showing cover 12 with portions of cover 12 extending radially outward in three different directions. The cover 12 completely shields the water inlet 15a (figure 2) from the normal flow direction. It is noted that the set of shroud water inlets 11a, 11b and 11c are not shielded by cover 12 but are spaced radially outward on shroud 11 with each of the water inlets having a curved recess that surrounds  
10 the port therein. For purposes of description only one of the shroud ports and inlets will be described; however, the others have similar shapes. Reference numeral 40 identifies an arcuate shaped recess 40 with an arcuate shaped port 41 positioned centrally therein at the bottom of the arcuate shaped recess 40. The purpose of having the port 40 located below the plane of the shroud is so that any debris that might block the opening 41 would not be able  
15 to come into direct contact with port 41, thereby allowing a continuing flow of water to channel or wash any debris off the smooth dome shape of shroud 11.

While flow is directed over the surface of the dome shaped shroud 11, there is included a set of scallops for funneling the water around the water purification device. As each of the  
20 scallops is identical, only one will be described herein. A scallop 11f is located in water purification device 10 to provide a larger area for water to flow past the shroud. As a result, water tends to funnel laterally into the scallop 11f and over the recessed areas of the shroud inlets thereby producing a washing action over the set of shroud water inlets 11a to thereby inhibit debris in the water from blocking or obstructing the shroud water inlets 11a, 11b and  
25 11c. It is apparent that in the present invention each of the water inlets includes either an obstruction or a flow diverter to inhibit debris from blocking the water inlets.

Located on the top side of water purification device 11 is a reminder dial that contains an outer section listing symbols that correspond to the month of the year and an interior rotatable dial 51 that can be rotated so that pointer 52 points to the month that the water purification device 10 should be replaced.

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Figure 4 shows a cross sectional view of the water purification device 10 with flow arrows indicating the multiple separate flows of water through the water purification device 10.

Located within the interior of the water purification device 10 is a water passage 60 that extends centrally through the water purification device 10, with the elongated slots 15a being  
10 in fluid communication with water passage 60. Extending circumferentially around passage 60 are a set of circumferential water inlets 60a that direct water radially outward from passage 60 into an annular chamber 80, wherein water flows through water purification materials 70 located in an annular compartment 83 within container 13. In the present embodiment the water purification materials 70 includes a silver ion generating material. In  
15 addition, zinc or other metals can be used and, if desired, limestone can be used to maintain the pH of the water. The present invention is well suited for the mineral type dispensers as the minerals can be shielded and protected from debris contamination.

Passage 60 includes a restriction 61 that comprises a radial restriction in flow area through  
20 passage 60. The purpose of restriction 61 is to increase the resistance to water flow through passage 81, thus creating a back pressure in region 81 in fluid passage 60 which causes water to flow laterally and radially outward through water inlet 60a and into the water purification material 70. The amount of restriction can be adjusted to maintain the proper flow through the water purification device by increasing or decreasing the diameter of the  
25 opening therein. It will be evident that the water flowing though inlet 15a has two routes, a first route straight through the water purification device 10 without contacting the minerals 70 and a second route through the water purification minerals 70.

To illustrate the multiple flow paths of water through the water purification device 10, reference should be made to Figure 4, which shows a water flow arrow 100. Water flows through primary water inlet 15a and into central chamber 81 in water passage 60. A portion of the water flow is delivered into minerals 70, as indicated by arrow 100a, and a further portion, indicated by arrow 100b, flows directly through passage 80 without coming into contact with the water purification materials 70. Thus, a portion of the primary flow of water that enters the top of the water purification device flows directly through the water purification device without contacting the water purification materials, while a further portion is brought into contact with the water purification materials 70.

Referring again to Figure 4, a second flow path of water into chamber 80 through inlets 11b is indicated by arrow 101. This portion of water flows downward into minerals 70 without any of the water stream being directed away from the water purification material.

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Figure 4 shows a third source of water flowing into the container 13 through the circumferential passage 22 which extends between container 13 and shroud 11. Arrow 102 indicates the direction of flow of water through passage 22 directly into the minerals 70. In each case the water flows through the minerals 70 and is discharged from the container 13 through water outlets 13a located at the lower portion of container 13a, as indicated by the arrows extending through outlets 13a. Thus, in operation of the invention, water can be directed through any of the three sets of water inlets with two of the water inlets including either a cover to prevent direct flow of water into the water inlets and the third water inlet having a recess with an arcuate shape that allows water to be funneled toward the inlet and thereby wash off any debris that may have a tendency to block the entry. From the above description it is apparent that in operation, two of the three water inlets direct all the water

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into the minerals 70, while the third inlet directs only a portion of the water into the water purification materials.

While only one set of water inlets could be used to direct water through the water purification device, the use of multiple water inlets, each of which have some type of mechanism for maintaining the water inlet in a debris free condition, greatly enhances the chances of at least some of the water inlets being maintained in an open condition so that water can be continually purified as water flows through the water purification device 10. Thus, the water purification device continues to provide enhanced water purification characteristics even though some of the water inlets may become blocked with debris.

Figure 5 shows the water purification device 10 located in a skimmer basket 202 in a swimming pool 200 with a bacteria killing puck 206 supporting the water purification device. A pivoting gate 201 permits enter of water 208 into skimmer basket 202. A pump 205 pulls water from the bottom outlet 204. In this condition the water impinges normally downward on the water purification device 10 as indicated by the arrows, with the water dividing and flowing as described in relation to Figure 4. In this condition, the water purification device 10 can both purify water with minerals as well as dispense chlorine, since the water purification device directs a stream of water over the chlorine source to provide a controlled release of chlorine.

Figure 5A shows an activity enhanced water purification system for a contained water volume such as a swimming pool or the like wherein the dispenser is fixedly mounted and the fluid flowing through the dispenser is altered. The system includes a pivotal gate 601 commonly referred to as a weir since it generally allows material to pass one way but inhibits material from passing in the opposite direction. Weir 601 has a front side 601a and a back side 601b. A pivot pin 602 permits the weir 601 to move back and forth in response

to the wave action of water 605. Located on back side 601b is a first dispenser 610 and a second dispenser 611. Dispensers 610 and 611 are mounted on weir 601 and move back and forth in the water as the weir moves back and forth in response to wave action. Each of dispensers 610 and 611 can contain a water treatment material, for example, an ion

5 generation material such as silver chloride and a halogen such as bromine. Normally, the dispensers continue to dispense the dispersant at a controlled rate. However, the presence of the dispenser on the weir can provide enhanced or accelerated dispensing when there is activity in the pool. That is, the skimmer weir generally does not move back and forth when there are no waves but floats in a near vertical orientation. In this condition the dispensers  
10 continue to deliver the dispersant to the pool at a preset rate. However, if the activity in the pool increases, such as by people playing or swimming in the pool, the increased wave action in the pool can cause the weir to move back and forth in water 605. The swishing movement of the weir 601 in the water in turn causes a swishing movement of the dispensers in the water which can increase the flow of water past the dispersant in the  
15 dispensers which can increase the rate of dispensing of the dispersant. Thus, the system can be at least partially responsive to an increased bacterial load in the water as a result of more activity in the pool. That is, when more people are in the pool or body of water more dispersant may be needed to offset the increased amount of bacteria in pool. However, since the activity of the people can cause waves which moves the weir back and forth this can  
20 cause a greater amount of dispersant to be released which can help counteract the increased bacteria load in the pool from the introduction of additional people into the pool. Thus, by placing the dispensers 610 and 611 in a position where increased activity in the pool can increase the agitation of the water in the dispensers one introduces a self correcting feature into the system.

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Figure 5B shows a back view of the pivotable weir 601 with dispenser 610 and dispenser 611 held thereon by a first rail 612 and a second rail 613. Figure 5C shows that rail 612

projects outward and forms an L-shaped recess 612b to capture one end of a dispenser. A stop 612 on the bottom of rail 612 prevents a dispenser from sliding out of the rail 612. Similarly, rail 613 projects outward and forms an L-shaped recess 613b to capture the other end of a the dispenser. A stop 613a on the bottom of rail 613 prevents a dispenser from  
5 sliding out of the rail 613. Alternately, the dispenser 610 and 611 could be secured directly to the back of weir 601 as shown in Figure 5A.

Figure 5D shows a pictorial view of two dispenser 610 and 611 for slideable mounting when rails are mounted on the back of weir 601. Each of the dispensers allow water to enter  
10 and discharge through the openings 610a and 611a in the side walls so the water can contact the dispersant located in a chamber in the dispenser. The embodiments shown includes openings therein for access to the contents of the dispenser; however, other types of dispense such as mesh bags or the like could also be used to hold the dispersant. Each of the dispensers having sufficient pores or ingress and egress passages so that enhanced flow  
15 around the dispensers also results in enhanced flow through the dispensers.

Thus the embodiment shows an activity enhanced water system for a contained water volume including a gate 601 pivotally mounted in a water container and a dispensing device 610 secured to said gate with the dispensing device comprising a dispensing container  
20 having a water dispensable material contained therein for dispensing the water dispensable at a first rate when the gate is stationary condition and at a second rate as the gate 601 pivots in response to waves in the water system.

25 Figure 6 shows the free standing water purification device 10 positioned in an alternate operating condition with the water purification device 10 supported in the bottom 207 of a skimmer basket by legs 31. The top of the water purification device 10 is located below the



top of the skimmer basket and the legs 31 support the water purification device 10 above the bottom 207 of skimmer basket to allow flow of water from the water purification device 10 through skimmer basket 202. Figure 6 is identical to Figure 5 except that the chemical puck 206 shown in Figure 5, which is preferably chlorine, has not been included in the system.

- 5 The advantage of placing puck 206 directly below the water purification devices, as shown in Figure 5, is that it provides a controlled release of chlorine. In addition, debris is prevented from piling on top of the puck 206 by the water purification device 10 that forms an umbrella or shield over the puck. Also, because the internal water passage 60 is large in comparison to the flow paths through the water purification materials, one is ensured that a
- 10 large portion of the fluid stream flows onto the chemical puck 206, thereby liberating the bacteria killing chemical. A further advantage is that a substantially more constant rate of water is directed onto the puck 206 than if the puck were maintained in a free condition in the skimmer basket.
- 15 While it is preferable to maintain the chemical puck beneath the water purification device in certain applications, it may not be necessary to shield the chemical puck 206. Figure 7 shows the water purification device 10 can be located below the skimmer basket 202 in a pool of water 208 with a bacteria killing puck 206 located in the skimmer basket and the water purification device 10 located in housing 211 that contains the skimmer basket 202.
- 20 The system of Figure 7 allows the maintaining of the bacterial killing chemical puck 206 separate from the water purification device and for maintaining the water purification device 10 in a position where the water is generally cleaner, since debris would be collected by the skimmer basket 202. Consequently, the present invention, while providing for operation in severe conditions, also permits the user to employ the water purification device 10 in various
- 25 operating positions while still maintaining an effective delivery system.

The present invention provides a method of purifying water in a fluid stream containing debris by placing a container 13 with a water purification material 70 therein, with the container 13 having a shroud 11 thereover so that the shroud is aligned in a direction at least partially normal to a flow of a stream of water so that at least a portion of the stream of water and debris therein impinges on the shield and is then carried past container 13, and at least a portion of the water stream is separated therefrom so as to flow laterally into the container 13, with the lateral flow of the portion of water inhibiting debris in the water from being carried into the water inlets and thereby inhibiting the obstruction of the water inlets.

10 The container 13 can be placed either in the skimmer basket or downstream of the skimmer basket. In addition, a bacterial killing chemical can be placed beneath the container so that water flowing through a passage in the container impinges on the bacteria killing chemical to kill bacteria.

15 In order to maintain proper flow through the container, one can place a restriction in the passage in the container so as to increase the pressure of fluid in a passage in the container to thereby direct more or less water in a second lateral direction into the container 13.

By forming the shroud 11 of larger diameter than the container 13, the shroud extends radially over the container 13 to thereby cause a further portion of water with debris therein to flow over the shroud 11 and past the container 13, while a portion of the water can flow laterally into the container 13 and through the water purification materials 70.

In summary, the present invention provides for effective dispersion of water purification minerals under a variety of adverse conditions, as well as providing the user an option to use the water purification device to shield solid chemicals that can be dispensed into the water to help maintain the purity of the water.

The water purification device 10, which is suitable for use inside or outside of a skimmer basket, is shown in Figures to include a water purification mineral 70 located in the annular container 13 for holding the water purification minerals 17, with the container 13 having an outlet for passage of water therethrough. The outlet passage comprises a set of openings 13a sufficiently small to maintain the minerals 70 in the container from being washed out. A shroud 11 extends over container 13 to deflect debris carried by the water away from the container 13. A first lateral water inlet 15a, comprised of vertical elongated openings directs a portion of water flowing thereto into the water purification mineral container 13 and a further portion through the container 13 without contacting the water purification mineral 70. The cover 11, which extends over first water inlet 15a, inhibits debris from blocking the first water inlet 15a. The second lateral water inlet, which is comprised of circumferential lateral inlet 22, directs a different portion of water beneath the shroud 11 and into the water purification mineral 70 in the container, and a third lateral water inlet comprised of shroud water inlets 11a, 11b and 11c, which are recessed in the shroud, direct a still different portion of water into the water purification minerals 70 so that water flowing through the water purification device 10 enters in discreet portions at multiple different locations in the water purification device 10, with each of the three multiple different locations at different vertical elevations on the water purification device 10.

In further embodiments of the present invention, various water purification systems or water treatment systems for a contained water volume, such as present in a swimming pool, spa hot tub or the like are disclosed. These systems utilize the adaptability of the present invention to function in a wide range of environments from a no flow environment to flow environment conditions and from debris free water to water containing debris.

Referring to Figure 8, a number of water treatment systems are depicted in relationship to a swimming pool 200. The treatment system that includes a skimmer basket 202 has been described above. Another treatment system includes the main drain intake 258 of the pool, while yet another treatment system includes the water return conduit 350 and inlet fitting 352. A treatment system that includes a floatation support member 300 is also described. Another treatment system includes a debris prefilter 400 for a pump 205, while yet another treatment system includes a fluid powered debris collection member 450. Also disclosed is a treatment system that includes a leaf trap member 500 connected to the pumping system for the pool 200, as well as a treatment system that includes a cartridge filter assembly 550.

Referring to Figures 9 and 10, one embodiment of the water treatment system of the present invention is shown. The system includes the water treatment device 10 described above that has a set of legs 31 for support. The device 10 is positioned on a supporting base member 250 immediately above the main drain intake 258 of a swimming pool 200. The base member 250 includes a circular concave top portion 252, with multiple apertures 254 therein, on which the device 10 rests. A number of support legs 256 are radially disposed around the circular concave top portion 255 to elevate the top portion 255 above the drain intake 258. As water is drawn into the drain intake 258, a portion contacts and flows through the water treatment device 10 as described above, thereby contacting the water treatment material 83 contained therein. The water treatment material 83 preferably includes a metal ion yielding material, and most preferably includes silver chloride. The water continues through the apertures 254 in the support concave top portion 252 and is drawn into the drain intake 258. The support concave top portion 252 is sized to accept a chemical puck 206 positioned beneath the legs 31 of the water treatment device 10. The puck 206 introduces chlorine or bromine to the water flowing into the apertures 254 and on to the main drain intake 258.

Another embodiment of the water treatment system of the present invention is shown in Figures 11 and 12. The system includes the water treatment device 10 described above that has a set of legs 31 for support. The device 10 is positioned in a floatation support member 300 that floats the treatment system on the pool water surface. The floatation support member 300 includes a hollow floatation top portion 302 and a weighted hollow bottom portion 304 for holding other water treatment materials and for controllably dispensing the other water treatment material therefrom. A converging central passage 306 from the floatation top portion 302 terminates at the hollow bottom portion 304, with the bottom opening controlled by a rotatable sleeve portion 310 with a perforated section 312. The converging central passage 306 is sized to accept the water treatment device 10 with the legs 31 resting on a ledge 308 in the passage 306. With the device 10 positioned in the converging central passage 306 of the floatation support member 300, pool water passes around and through the device 10 as described above, thereby contacting the water treatment material 83 contained therein. The water treatment material 83 preferably includes a metal ion yielding material, and most preferably includes silver chloride. The water flows through the converging central passage 306 and out the perforated section 312 of the rotatable sleeve portion 310. The converging central passage 306 is sized to accept a chemical puck 206 positioned beneath the legs 31 of the device 10 and supported on the ledge 308 of the passage 306. The puck 206 introduces chlorine or bromine to water flowing through the passage 306 of the floatation support member 300.

Referring to Figures 13 and 14, another embodiment of the water treatment system of the present invention is shown. The system includes a water return conduit 350 held in position on a pool wall 210 by a water return inlet fitting 352. The conduit 350 returns water to the pool 200 from various debris removal/filtration units with the pump 205 providing movement of water through the units and through the conduit 350. A hollow mushroom-shaped mounting flange member 360, having a top portion 362 with an aperture 364 therein,

is secured to the return conduit 350 by removing the inlet fitting 352 from the conduit 350, positioning the aperture 364 of the mounting flange member 360 over the conduit 350 and reattaching the inlet fitting 352 to the conduit 350. The mounting flange member 360 includes a set of resilient mounting leg members 366 extending opposite the top portion

5 362. Each leg member 366 has a ridge portion 368 at the end thereof. The leg members 366 are designed to secure the water treatment device 10 to the mounting flange member 360 by inserting the leg members 366 into the central passage 60 of the device 10, where the leg ridge portions 368 engage the radial restriction 61 of the passage 60, to secure the device 10 to the mounting flange member 360. The central passage 60 and the radial restriction 61 of

10 the device 10 are best seen in Figure 4.

Pool water from the water return conduit 350 is directed toward the central passage 60 of the water treatment device 10, and through the device 10, thereby contacting the water treatment material 83 contained therein. The water treatment material 83 preferably includes

15 a metal ion yielding material, and most preferably includes silver chloride. The water treatment device 10 is easily replaced with a fresh device 10 when the water treatment material 83 of one device 10 is spent.

Figure 13A shows a further activity enhanced dispensing system that is mounted in the

20 transition region directly on the water inlet of a contained water volume system. Examples of contained water systems includes spas, pools, jetted bath tubs as well as other types of recirculation systems. A dispenser 650 is shown mounted on wall 652 and secured in the inlet passage 651. Dispenser 653 comprises a housing having a set of openings 653a on one side and a further set of opening 653b on the opposite side. A diverter cover 654 (see

25 Figure 13B) rotatably mounted on the housing 654 by member 656 allows one to control the amount of water flowing through the housing by opening or closing more holes through

the dispenser. In order to maintain dispenser 650 in the water inlet a set of resilient flanges 655 engage the water inlet and hold the dispensing 650 in position.

Figure 13C shows a back view of the dispenser 650 to reveal the cantilevered resilient  
5 fingers 655 that are circumferentially positioned about the housing to enable one to mount  
the dispenser 650 directly on a fluid intake in a contained water system. In operation of the  
dispenser shown in Figure 13a the water flows in the direction of the arrows and flows  
through the system. Dispensing device 650 can be mounted on a recirculation port in a  
body of water that may normally be in an off condition when there is no activity in the body  
10 of water. In this condition the dispersant is directed into the body of water surrounding the  
dispenser. When there is activity in the body of water the circulation system the water is  
forced through the water inlet and consequently through the dispenser housing and through  
the entire system. For example, in a hot tub as the jets are turned on the water is pulled in  
through water inlet 651 when the pump is started. The increased flow through the dispenser  
15 can increase the rate of dispersant dispensing into the water and thus one can automatically  
increase the rate of dispersant in response to a person or persons getting into the contained  
water volume which normally increases the bacterial load and at the same time cause the  
dispersant to be distributed to all parts of the system as the water begins flowing through  
passage 651.

20 Thus the embodiment of Figure 13A shows a water system for a contained water volume  
comprising a water conduit 651, a transition region mounted dispensing device 653 secured  
to water conduit with dispensing device 653 comprising a dispensing container having a  
water dispensable material 649 contained therein for dispensing the water dispensable  
25 material at a first rate when there is not flow through the water conduit and at a second  
rate in response to water not flowing through the water conduit 651.

Figure 13F shows a dispenser container that is mounted in a transition region in the jet outlet of a water system such as found in spas, pools, hot tubs, jetted tubs and the like. The dispenser container 70 is mounted in the outlet passage 702 with the arrows indicating the direction of motion of the water. In the embodiment shown, the dispenser has a streamlined shaped and is held in the passage 704 by a set of three resilient arms 703, 704 and 705 that frictionally engage the passage 702. The dispenser container 700 has a central passage 700b located inside a hollow extension 709 that allows water to flow through and be discharged through openings 700a.

10 Figure 13G shows the dispenser in greater detail with the dispenser having a chamber 710 with dispenser 711 located therein. A set of openings 700a permits water come into contact with the dispenser 711. The resilient arms have an end for engaging the walls of passage 702. That is the end 703a and the end 704a include pointed or abrasive regions that will engage the side of the passage 702 when the resilient arms 704, 705 and 703 are radially compressed and then allowed to radially expand into frictional engagement with the sidewall 702.

In operation of the dispenser of Figure 13G the water enters the dispenser through the inlet passage 700b and flows therein to the dispersal chamber 710. The dispersant then flows through the passages 700a as indicated by the arrows.

In the embodiment shown the drag on the dispenser by the water flowing therepast will normally hold the dispenser in a centered condition within the jet as the extension members 703, 704 and 705 frictionally engage the side walls. If desired, a set of radial spokes could be mounted on the end of dispenser 700 to fixedly hold the dispenser in the center of passage 702. To remove the dispenser 700 one need only radially compress legs 703, 704 and 705 and pull the dispenser from the outlet. Thus, the present invention provides a



dispenser that can be quickly mounted in the discharging jet of a fluid stream and can dispense material. Since the jets are normally only active when there is activity in the contained water volume it will be appreciated that the present invention by virtue of flowing more water through the dispenser will provide for an extra charge of dispersant when it is  
5 needed the most. That is, the activity in the water volume that generates bacteria and the like is also the activity that triggers the action of the jet which delivers an increased rate of dispersant into the body of the water. Thus while the embodiment of Figures 13a can direct additional dispersant into the entire system the embodiment of Figures 13F can direct additional dispersant directly into the body of water. A user can select dispenser to the type  
10 of dispensing needs. If it is desired to quickly increase the amount dispersant in the body of the water due to system activity the embodiment of Figure 13F can be used. On the other hand if it is desired to increase the amount of dispersant in the system due to system activity the embodiment of Figure 13A can be used.

15 Figure 13D shows an alternate embodiment of the dispenser shown in Figure 13D wherein a dispenser 720 is mounted in a jetted outlet passage 721 through an external mounting member. The container 723 includes a ring or collar 722 that surrounds the water jet outlet 721. In this embodiment the dispenser 720 includes a chamber 725 and a dispersant 728 with water directed through the openings 720a in the dispenser 720. The water can enter the  
20 dispenser through the inlet conduit 730 and discharge through the dispenser 728 as indicated by the arrows.

Figure 13E shows a partial end view of the members 735, 736 and 737 located at 120 degree intervals and engaging ring 722. The members 735, 736 and 737 can have the ends  
25 secured to the ring by engagement with radial holes in the ring 722 or the ends of the 735, 736 and 737 can have sharpened points and 735, 736 and 737 can be made from a resilient

material that resiliently causes the ends of members 735, 736 and 737 to engage the ring and hold the ring in position.

Thus the embodiment of Figures 13E, Figure 13F and Figure 13G show the dispenser  
5 mounted in the interior of the jetted outlet passage and Figures 13D and Figure 13E show the dispenser mounted exterior to the jetted outlet passage; however, in both units a portion of the water flowing thereto is directed through the dispenser. Thus the two embodiments both provide for greater dispenser into the contained volume in response to action of the jets of the system with the embodiment of Figures 13E-H immediately increasing the dispersant  
10 in the body of water surrounding the dispersant and the embodiment of Figures 13A-C immediately increasing the dispersant in the body of water circulating to other parts of the system with both of the systems being responsive to either a direct or indirect activity increase in the body of water.

15 Referring now to Figures 15 and 16, yet another embodiment of the water treatment system of the present invention is shown. The system includes a water return conduit 350 held in position on a pool wall 210 by a water return inlet fitting 352. A flexible hose member 380 is secured at one end to the return conduit 350 and at the other end to a floatation support member 300 that includes a hollow floatation top portion 302 and a weighted hollow bottom  
20 portion 304. A converging central passage 306 from the floatation top portion 302 terminates at the hollow bottom portion 304, with the bottom opening controlled by a rotatable sleeve portion 310 with a perforated section 312. The hollow floatation top portion 302 includes an interior passage 382 joined at one point to the flexible hose member 380 and having outlet apertures 384 radially disposed around the central passage 306 and near  
25 the top thereof. The converging central passage 306 is sized to accept the water treatment device 10 with the legs 31 resting on a ledge 308 in the passage 306. With the device 10 positioned in the converging central passage 306 of the floatation support member 300, pool

water from the inlet conduit 350 flows through the flexible tube member 380 and the joined interior passage 382 and out the apertures 384, and passes around and through the device 10, thereby contacting the water treatment material 83 contained therein. The water treatment material 83 preferably includes a metal ion yielding material, and most preferably includes silver chloride. The water flows through the converging central passage 306 and out the perforated section 312 of the rotatable sleeve portion 310. The converging central passage 306 is sized to accept a chemical puck 206, such as chlorine, positioned beneath the legs 31 of the device 10 and supported on the ledge 308 of the passage 306. The puck 206 introduces chlorine or bromine to water flowing through the passage 306 of the floatation support member 300.

Yet another embodiment of the water treatment system of the present invention is shown in Figure 17. The treatment system includes a debris prefilter member 400 for the pump member 205. The prefilter member 400 includes a housing 401 with an inlet 402 and an outlet 404 with a debris-retaining mesh basket member 406 positioned within the housing 401 so as to collect debris from water received entering from the inlet 402. The housing 401 includes a basket member access opening 408 with a removable cover member 410 secured thereto. A gasket member 412 seals the cover member 410 to the access opening 408 to prevent water leakage, and another gasket member 414 is employed to seal the prefilter member outlet 404 to the pump inlet (not shown). The water treatment device 10 is positioned within the mesh basket member 406 with the support legs 31 resting on the bottom of the basket member 406, as shown in Figure 17. As water is drawn into the prefilter member 400 and through the basket member 406, a portion contacts and flows through the water treatment device 10, as described above, thereby contacting the water treatment material 83 contained therein. The water treatment material 83 preferably includes a metal ion yielding material, and most preferably includes silver chloride. The water continues through the prefilter member 400 and on to the pump member 205.

Referring now to Figures 18 and 19, yet another embodiment of the water treatment system of the present invention is shown. The system includes a fluid powered debris collection member 450 that includes a collection member housing 452 with an attached debris-

5 collection mesh bag member 460 secured thereto. The housing portion 452 includes a hose attachment fitting 454 that connects to an external water source, such as a garden hose, and a handle attachment fitting 456 for use in directing the collection member 450 during use. The housing portion 452 is hollow with a brush member 458 radially disposed about the bottom end thereof, and with the mesh bag member 460 secured to the housing top end by means

10 of a retaining flange 464 and a drawstring 462 on the bag member 460. The collection member 450 operates by submersion in the pool 200 with the connected water source directed upwardly within the housing 452 and into the mesh bag member 460. Moving the debris collection member 450 over the bottom of the pool 200 by means of a handle member (not shown) secured to the handle attachment fitting 456, with the water hose

15 directing water into the mesh bag member 460, causes debris to be carried into and collected by the mesh bag member 460. The water treatment device 10 is positioned within the mesh bag member 460, as shown in Figure 18. As water is drawn into the collection member housing 452 and through the mesh bag member 460, a portion contacts and flows through the water treatment device 10, as described above, thereby contacting the water treatment

20 material 83 contained therein. The water treatment material 83 preferably includes a metal ion yielding material, and most preferably includes silver chloride. The treated water thus remains within the pool 200.

Yet another embodiment of the water treatment system of the present invention is shown in

25 Figure 20. The treatment system includes a leaf trap member 500 for use in removing leaf debris from the pool 200. The leaf trap member 500 includes a housing member 501 with an intake 502 and an outlet 504 and contains a debris-collecting mesh bag member 506

positioned within the housing 501, so as to collect debris from water entering through the housing intake 502. To the intake 502 is connected an intake hose 508, that the user directs to suck up debris, and an outlet hose 510 that connects the leaf trap housing 501 to a suction source, such as the conduit system leading to the pump member 205, as shown in Figure 8. Debris laden water flows into the intake hose 508 and debris collects in the mesh bag member 506 within the housing 501. The water treatment device 10 is positioned within the mesh bag member 506, as shown in Figure 20. As water is drawn into the leaf trap member 500 and through the mesh bag member 506, a portion contacts and flows through the water treatment device 10, as described above, thereby contacting the water treatment material 83 contained therein. The water treatment material 83 preferably includes a metal ion yielding material, and most preferably includes silver chloride. The water continues through the leaf trap member 500 and through the water circulation system and on to the pump member 205.

Referring now to Figures 21 and 22, yet another embodiment of the water treatment system of the present invention is shown. The system includes a cartridge filter assembly 550 that operates in the water circulation system for the pool 200. The cartridge filter assembly 550 is positioned downstream from the pump member 205, as illustrated in Figure 8. The cartridge filter assembly 550 includes a filter housing 551, having an inlet 552 and an outlet 554 with a cartridge filter member 556 supported within the housing 551. The cylindrical filter member 556 includes a central aperture 558, extending from top to bottom of the filter member 556, and a pleated filter element 560 vertically disposed around the cartridge 556. Water flows into the cartridge housing 551 via the housing inlet 552, through the cartridge filter member 556 and out of the housing 551, via the housing outlet 554. Atop the cartridge filter member 556 is positioned a support member device 580. The device 580 includes a support deck 582 with an aperture 584 therein. A number of leg clip members 586 are radially disposed around the support deck 582 for fastening the support member device 580

to one end of the cartridge filter member 556. The water treatment device 10 is positioned on the support member device 580 within the aperture 584 of the support deck 582. As water flows through the cartridge filter assembly 550, a portion contacts and flows through the water treatment device 10, as described above, thereby contacting the water treatment material 83 contained therein. The water treatment material 83 preferably includes a metal ion yielding material, and most preferably includes silver chloride. The treated water continues through the water circulation system and returns to the pool 200. Figure 21 and Figure 22 illustrate the water treatment support deck 582 above the filter the water treatment support could be positioned below the cartridge filter member 556.

10

Figure 21A shows another dispenser system 800 that includes a stand 801 that supports a first dispenser 802 and a second dispenser 803 proximate the end of a system filter 810. In the embodiment shown the dispenser 802 and dispenser 803 are positioned in a spaced distance from the filter cartridge and are supported on the end of the cartridge housing so as to deliver the dispersant into a chamber proximate the filter cartridge.

15

Figure 21B shows a partial end view of the filter 810 with the end plate 810a of the filter located on the top portion of filter cartridge 810. The stand 801 includes a central split member 802 having a slot 802a ends 803 and 804 for engaging the end plate 810a of the cartridge. The slot 802a permits one to radially squeeze the member 803 and 804 inward. That is, by squeezing member 802 one can insert the members 803 and 804 into the end plate opening in plate 810a and then by releasing the pressure the resilient member 802 causes legs 803 and 804 to bite into the end plate to hold the stand in an upright position.

20

With the stand held in the upright position as shown in Figure 21B the arm 815 with hook 816 can support one dispenser thereon and the arm 817 with hook 818 can support a second dispenser thereon.

25

Figure 21C discloses a partial section view of dispenser 808 which contains a dispersant. The dispenser 802 includes an extension 802a with a slot 802b that can be engaged with hook 816 to hold the dispenser in a dispensing position on the stand 801.

5

Thus the transition region mounting of the embodiments of Figure 21A, Figure 21B and Figure 21C provide for mounting a dispersant unit in a portion of the system where the dispersant yield can be automatically increased as the system is activated due to increased activity in the body of water. Since the housing is not present in the filter core the flow  
10 through the cartridge is not altered or restricted.

Figure 22A and Figure 22B show an alternate embodiment of a dispenser system for use in conjunction with a cartridge filter system. In the embodiment shown a filter housing 850 includes a filter cover 851 with a first dispersant 853 mounted on one side of cover 851 and  
15 a second dispenser 852 mounded on the opposite side of the cover. Both of the dispersant chambers of dispenser 852 and 853 are located in the chamber 854 above filter 856. The advantage of the dispenser system of Figure 22A and Figure 22B is that the dispenser can be replace by merely unscrewing the dispenser housing from the filter housing cover 851.

20 Figure 22b shows the dispenser 852 mounted in the cover 851 though a set of threads 865 that engage a set of threads 851a in the cover. A sealing ring 863 extends around the dispenser and engages a sealing surface 861a so that the dispenser cover 851 can be sealable connected to the cover dispenser flange 861. A finger tab 860 permits one to rotate the dispenser 852 to either bring the dispenser flange 861 into sealing engagement with the  
25 cover 851 or to bring the dispenser flange 861 out of sealing engagement with the cover 851. In addition the rotation of finger tab allows one to vertically position the amount of the dispensing unit in contact with the liquid to enable one to control the dispersal rate.

Thus the embodiment of Figure 22A and Figure 22B provide for a transition mounted dispenser that can be mounted directly in the cover of the filter housing and, more specifically, a water system for a contained water volume comprising a water filter housing 850 having a chamber 854 therein, a cap 851 on water filter housing with the cap having an opening 851a therein for mounting a dispenser thereto with the dispenser at least partially located in the chamber to enable water flowing therethrough to receive the dispersant at a first rate when the water is flowing through the water filter housing and at a second rate when the water is not flowing through the water filter housing.

10

Thus the invention of Figures 21A-C includes water system for a contained water volume comprising a filter housing 850, a filter 810 having an end cap 810a located in filter housing 850, a stand 801 positioned proximate the filter 810 with a dispensing device 808 secured to stand 801 with the dispensing device comprising a dispensing container 808 having a water dispensable material contained therein for dispensing the water dispensable material at a first rate when there is not flow past the filter and at a second rate in response to water flowing through the filter and the invention of Figures 22A provide for a water system for a contained water volume comprising a water filter housing 850 having a chamber 854 therein, a cap 851 on the water filter housing with the cap 851 having an opening 851a therein for mounting a dispenser 852 thereto with the dispenser at least partially in the chamber 854 to enable water flowing therethrough to receive the dispersant at a first rate when the water is flowing through said water filter housing and at a second rate when the water is not flowing through said water filter housing.

20

25 Figure 23 discloses a filter system wherein the dispensing units sit in the cover of the skimmer filter. Skimmer filters are known in the art. One such device is shown in U.S. patent 5,328,602. In the embodiment shown filter system 900 includes a housing 901 with



the housing having openings positioned around the top to permit ingress of liquid such as water therethrough. A chamber 905 is located above filter 906. Extending through the cover are a set of dispensers 907 and 908 which are identical to the dispensers shown in Figure 22a. In the embodiment of Figure 22A the dispensers are located on the high pressure side of the filter; however, in the embodiment of Figure 23 the dispensers are located on the low pressure side of filter.

The dispensers of Figure 22A and 23 are shown to include threads to permit rotational engagement with the cover. The threads can be used to also control the depth or length L that the dispensing device contacts the liquid.

While the invention has been shown in relation to a swimming pool the invention is usable with other contained water systems including spas, hot tubs and the like and the water treatment device is suitable for holding a range of various water treatment materials such as softeners, algaecides, bactericides.